

New Silverfish Taxa from Queensland (Zygentoma: Lepismatidae)

GRAEME B. SMITH

Australian Museum, 6 College Street, Sydney, New South Wales 2010, Australia
Federation University Australia, PO Box 663, Ballarat Victoria 3353, Australia
le_gbsmith@optusnet.com.au

ABSTRACT. A new genus and species of the silverfish subfamily Ctenolepismatinae and the first endemic species of the Lepismatinae are described from Queensland. A single male specimen of *Qantelsella louisae* n.gen., n.sp., was collected from dry leaf litter in Bladensburg National Park near Winton. *Xenolepisma monteithi* n.sp. is known from one adult female and two juvenile specimens collected with ants (*Crematogaster* sp.) from the bark of a tree on the Cape York Peninsula. This genus is also known from southern Africa, India and Malaysia and the diagnosis of the genus is emended to include the morphological differences exhibited by the Australian species.

KEYWORDS. Thysanura, taxonomy, new species, new genus, *Qantelsella*, *Xenolepisma*.

SMITH, GRAEME B. 2015. New silverfish taxa from Queensland (Zygentoma: Lepismatidae). *Records of the Australian Museum* 67(3): 67–81.

Silverfish of the family Lepismatidae are quite common in Australia although in general poorly collected. This is possibly due to their cryptic habits combined with extreme speed and agility and their comparative fragility. Escherich (1905) described the first Australian lepismatid (*Acrotelsella producta* as *Acrotelsa producta*) from Peak Downs near Capella in the central highlands of Queensland. Silvestri (1908) described several Western Australian species belonging to the genera *Acrotelsella* Silvestri, 1935 (as *Acrotelsa* Escherich) and *Heterolepisma* Escherich, 1905, as well as a single specimen of *Anisolepisma* Paclt, 1967 (described as *Heterolepisma hartmeyeri*). Nicholls & Richardson (1926) described a further two Western Australian *Acrotelsella* species. Womersley (1939) reviewed the Australian fauna, describing two South Australian species of *Acrotelsella* and, in 1942, a species of *Heterolepisma* from Lord Howe Island. The lepismatid fauna was largely ignored for the next 70 years, until recently when Smith (2013, 2014) described three new species of *Heterolepisma*; one from

Barrow Island, the others from eastern New South Wales.

Collection efforts by the author, as well as examination of some of the material in museum collections has indicated a much richer and diverse Australian fauna, with many undescribed species, dominated by the genera *Acrotelsella* and *Heterolepisma*. This paper will however describe the first Australian members of two genera that appear to be comparatively uncommon (see Fig. 1 for known locality data), one new and the other previously known from Africa and Asia.

Materials and methods

Specimens were collected either by hand in leaf litter or by spraying the trunks of trees with a pyrethrum spray (Baehr, 1995). Locality co-ordinates for specimens were obtained using a hand held Garmin eTrex®10 GPS with a claimed accuracy usually under five metres. All specimens were stored in 75–80% ethanol. A mesothoracic leg was removed about two months after collection, placed in 100%

ethanol and stored at about 4°C for DNA extraction (to date unsuccessfully). Methodology for the measurement of specimens, their dissection, mounting in Tendeiro solution and illustration conform to those of Smith (2013).

Roman numerals are used to indicate abdominal segment number. In addition, the following abbreviations are used: *ANIC*, Australian National Insect Collection, Canberra; *asl*, above sea level (in metres); *HW*, head width (in millimetres); *H+B*, head and body length (in millimetres); *L/W*, length to width (ratio); *PI*, *PII*, *PIII*, legs of prothorax, mesothorax and metathorax respectively. The term *macrochaetae* refers to the larger stronger bristles, *setae* refers to smaller thinner bristles, *setulae* to the very small, usually straight setae associated with the combs and *cilia* to the curly thin hairs also often associated with the combs. References to left and right refer to the left and right of the animal when observed from above with the head forwards.

Specimens of the new species are deposited within the entomological collection of the Queensland Museum, Brisbane (QM) with specimen accession numbers listed with the material examined.

Systematics

Lepismatidae Latreille, 1802

Subfamily Ctenolepismatinae Mendes, 1991

Qantelsella n.gen.

Type species: *Qantelsella louisae* n.sp.

Diagnosis. Small to medium-sized silverfish. Body shape as in Figs 2 and 3. Pigment present. Macrochaetae variably plumose, often quite stout (short and thick). Antennae with both circular (poculiform?) and rod-like basiconic sensillae. Chaetotaxy of frons consisting of mostly strong marginal macrochaetae which form 1+1 weak bushes anterolaterally, 1+1 weak submarginal groups at the level of the antennae not greatly separated from the marginal macrochaetae, some macrochaetae extending over the anterior part of the eyes and two macrochaetae behind the eyes; clypeus with 1+1 groups of macrochaetae; labrum with transverse proximal row of macrochaetae. Apical article of labial palp with long row of sensory papillae. Thoracic nota with short lateral bristlecombs and 1+1 posterolateral bristlecombs each with single macrochaeta; trichobothrial areas of type 1. Thoracic sternites trapezoidal with 1+1 posterolateral combs. Tarsi with four articles, pretarsus with two claws and a medial empodial claw. Urotergite 1 with 1+1 and II–VIII each with 2+2 bristlecombs, IX glabrous. Urotergite X short, subtriangular with many marginal macrochaetae, without 1+1 bristlecombs. Urosternites I–II without setae and III–VIII with 1+1 bristlecombs. Two pairs of stylets. Parameres absent. Penis typical for family; two segmented, apically with many short glandular setae each set on a protuberance.

Female unknown.

Etymology. The genus is described from a specimen collected near the town of Winton in central Queensland, a town which also claims to be the “birthplace” of Australia’s national airline Qantas (pronounced “kwantas”). The genus name is based on a combination of part of the airline name with “telsella” referring to its possible relationship to the genus *Acrotelsella*. It is treated as grammatically feminine.

Qantelsella louisae n.sp.

Figs 2–46

Type material. Holotype ♂. (HW 1.10) (QM T228755 on two slides) Queensland: Bladensburg National Park, Skull Hole, 22.55789°S 143.00044°E 204 m asl, 8.viii.2013, Graeme Smith, in dry leaf litter.

Description

Appearance in life mottled grey with distinct lighter, almost white, scales on sides of head and along both sides of abdomen and margins of urotergite X, legs above darkish grey on tibia and femur with lighter brown tarsi, antennae with darker brown pedicel, flagellum distinctly banded brown and white with the browner bands becoming longer distally, terminal filaments evenly brown (Fig. 2).

Body shape as in Figs 2 and 3, neither elongate nor broad. Body length 7.3 mm (♂); HW: 1.23 mm; thorax: length 2.4 mm (or 0.33 times H+B); width 1.75 mm widest at the mesothorax; antennae length 6.5 mm (or 0.9 H+B); cerci damaged, maximum preserved length 3.75 mm (or 0.51 H+B); median dorsal appendage broken, maximum preserved length 5.05 mm (or 0.69 H+B). Thorax only slightly wider than abdominal segment I, the following abdominal segments about the same width until the fifth or sixth and only narrowing moderately towards the posterior end.

Base colour white to light brown. Pigment brown and quite dark in places. Antennae annulated with darker brown bands getting proportionately longer distally, scape and pedicel darkly pigmented, caudal filaments more or less evenly brown, although with the hint of lighter area at the distal end of some subarticles. Head with pigment around the eyes and especially across the clypeus and labrum, mouthparts also with pigment especially laterally and palps with pigment on each article, especially distally. Coxae with dark pigment on anterior “shoulders” and along outer margin, trochanter with pigment along posterior margin, femur with pigment darker along margins especially distally and on distal end of dorsal surface, tibia more darkly pigmented with very dark patch at distal end, first article of tarsi pigmented distally, PII and PIII with some light pigment also on other tarsal articles. Urosternites VIII and especially IX, quite pigmented or more heavily sclerotized.

Body well covered with scales which are dark in colour (in alcohol), unevenly rounded, ovoid, distally truncate or even somewhat irregular with notches in the distal margin, with numerous brown subparallel ribs that do not extend beyond the margin (Fig. 4); scales lighter or hyaline along outer margin of urotergites, especially anteriorly. Ventral scales hyaline medially but brown laterad of the combs of macrochaetae. Dark scales also present on pedicel and scape and second and third articles of maxillary palp but not labial palp. Present on top of head and on labium, on all thoracic sterna and all articles of the legs except the last three tarsal articles; also present on more basal articles of cerci.

Macrochaetae quite variable, mostly pectinate, often very dark, almost black but others brown and many hyaline. The degree of pectination varies enormously, from almost smooth with a few small, hardly visible, delicate sharp pectinations to very plumose with long sharp pectinations which give an almost feathery appearance (Fig. 5) which are mostly found on posterior segments and basal articles of terminal

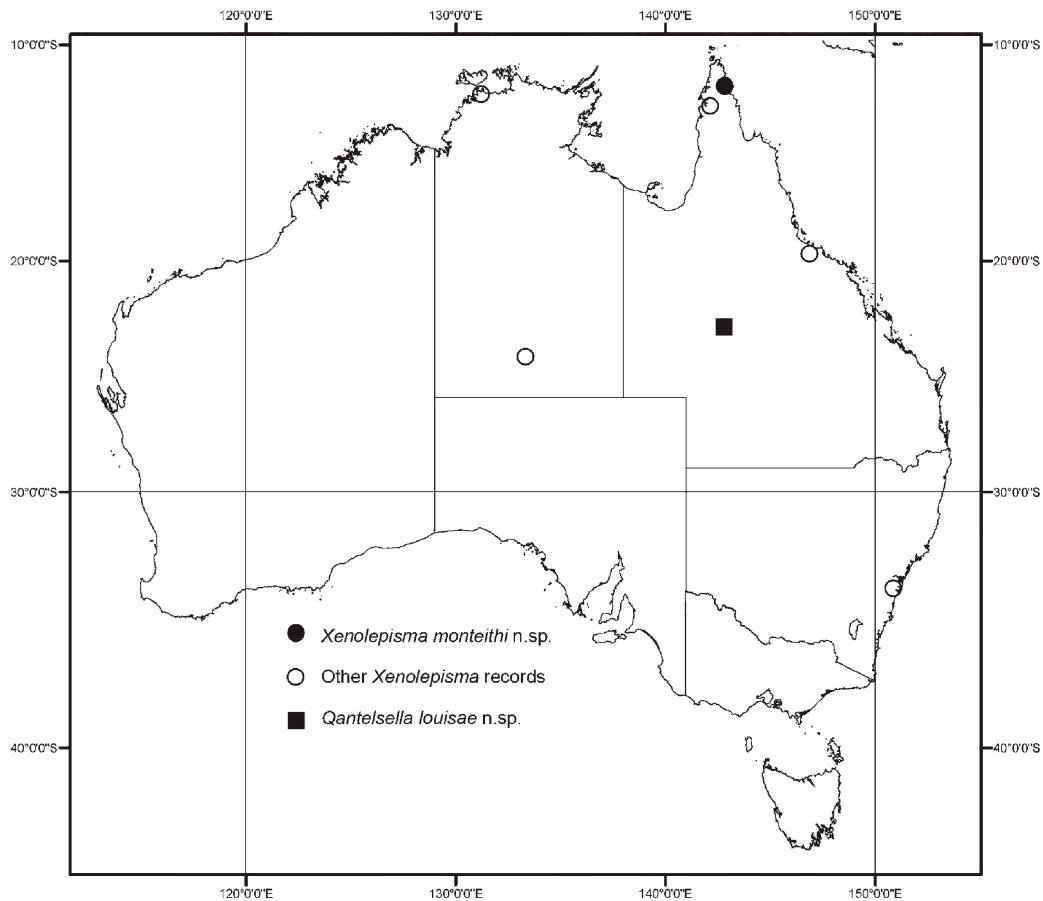


Figure 1. Collection localities.

filaments. Other macrochaetae are shorter, often thicker and quite stout, almost carrot-shaped, with small pectinations (Fig. 6); these are found mostly associated with the lateral combs, along the margin of the nota and on the legs. Other pectinate macrochaetae are darker with much more rounded apical pectinations (Fig. 7), such as the longer macrochaetae of the combs and lateral margins of the nota and legs. Some macrochaetae look slightly misshapen in their basal half and it is unknown if this is the natural state or related to the mounting medium as noted occurring with some nicoletiids silverfish mounted in the same way (Smith *et al.*, 2012).

Head (Fig. 8) wider than long, with macrochaetae along the anterior and lateral margins of the head and over the anterior margin of the eyes, generally this marginal row is only one to two macrochaetae wide although there are areas three to four macrochaetae wide on the anterolateral corners of the head; with 1+1 long, thin setae sublaterally on each side just posterior to the antennae and two strong macrochaetae behind the eyes on each side. Clypeus with 1+1 macrochaetae immediately anterior to the frons suture and 1+1 fields of about 14 macrochaetae more anteriorly. Labrum with a band of strong macrochaetae across the proximal quarter and additional small setulae distally. Eyes dark brown. —Antennae: scape (Fig. 9) quite long with short, robust, weakly pectinate setae subapically, pedicel shorter (0.42 length of scape) with subapical rosette of short, strong, weakly pectinate setae and several cilia, third article shorter with a few short setae and two trichobothria, fourth article shorter with some setae and three trichobothria, articles five to seven progressively a little longer with setae, three trichobothria and one to three cilia, article eight weakly subdivided into two subarticles, the basal portion without

chaetotaxy, the distal portion with setae, two trichobothria and four quite long cilia (almost as long as the short trichobothria), first pigment band on article nine, subsequent articles with similar chaetotaxy, subarticles further dividing from article 11 with trichobothria only present on the ultimate subarticle. Small circular sensillae appear from about one quarter of the length of the flagellum, becoming larger and easier to see in the more distal articles (Fig. 10), although much harder to locate on the heavily pigmented articles. They appear to be present on most subarticles although not on all. These sensillae, difficult to observe under an optical microscope, are almost circular with a raised perimeter ridge without any obvious structure emerging from within the ridge. They are probably poculiform sensillae (see electron micrograph in Irish & Mendes, 1988 p. 281 fig. 1), however, in several examples, the lip appears to be extended distally so that they resemble scutelliform sensillae (see Irish & Mendes, 1988, p. 281, fig. 5). New material and electron microscopy is required to clarify the nature of these sensillae. Rod-like basiconic sensillae also appear on the most distal subarticles in the distal half of the antennae but only in small numbers (two?). Trichobothria absent from all articles in last third of flagellum. —Mandibles (Figs 11, 12) typical for Ctenolepismatinae with well-developed molar and incisor regions; a group of eight or nine strong, apically bifurcated but simple, setae distally adjacent to the molar area and a bush of about 40 strongly pectinate macrochaetae and setae externally. —Maxilla (Figs 13–15) with four pectinate macrochaetae externally proximal to the palp, the lacinia with three teeth, one shorter than the rest, followed by about nine lamellate processes and a row of four apically bifurcate setae; ultimate article of maxillary palp 2.9 times longer than wide

Figure 2. *Qantelsella louisae* n.sp.

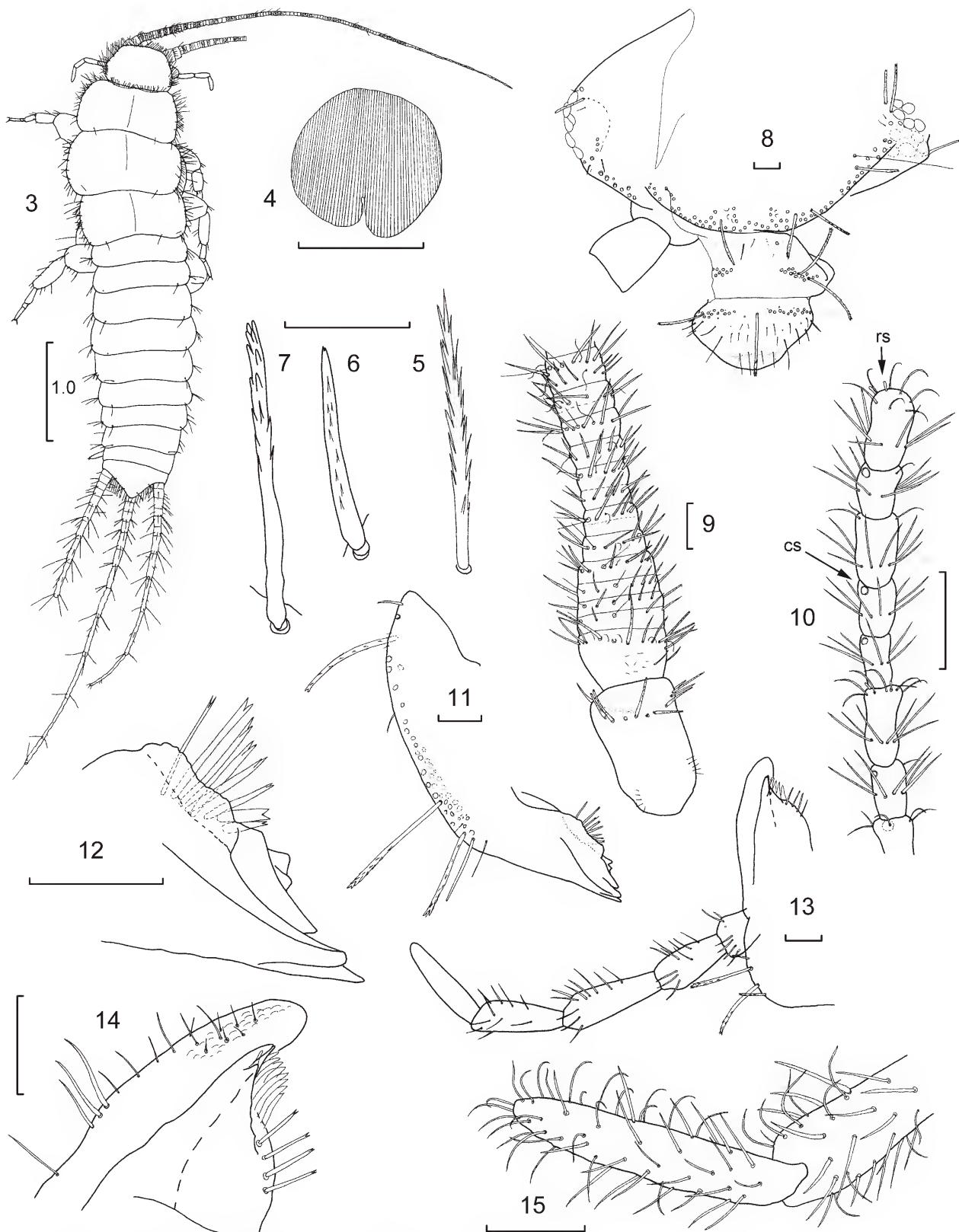
and 1.2 times longer than penultimate article, without any obvious papillae or specialized sensillae. Remaining articles with many moderately strong setae and no obviously stronger setae. Last three articles of palp with fine setae and cilia, basal and second articles with subapical coronae of slightly thicker setae. —Labium (Fig. 16) short and broad with rows of short, strong, apically bifurcate setae on the prementum; postmentum with a transverse row of apically bifurcate setae; glossae and paraglossae quite broad with short curved setulae. Labial palp short, ultimate article hatchet-shaped, expanded medially (Fig. 17), $\frac{1}{3}$ to $\frac{1}{2}$ wider than long (L/W 0.66–0.81) with a long, almost straight row of papillae of the “aufgelöst type” (11 on one palp, 13 on the other), apparently without other specialized sensillae; covered with numerous fine short stout setae and long fine cilia.

Pronotum (Fig. 18) with setal collar of pectinate macrochaetae in single row. Lateral margins with pectinate macrochaetae as well as three small combs anterior to the first trichobothrial area (respectively with two, three and two macrochaetae of different lengths) and some strong submarginal macrochaetae posterior to this trichobothrial area but not forming obvious combs. Anterior trichobothrial area (Fig. 19) about one third along the margin and the posterior area (Fig. 20) a little further than two thirds along the margin. Posterior margin with 1+1 single pectinate macrochaetae, each associated with two cilia and a marginal setula (Fig. 21). —Mesonotum (Fig. 22) lacking anterior

notal collar, lateral chaetotaxy similar to pronotum with five combs each of two macrochaetae anterior to the first trichobothrial area which is located about half way along the lateral margin (Fig. 23); posterior trichobothrial area (Fig. 24) slightly further back than three quarters of the way along the margin; posterior margin with 1+1 single macrochaetae as in the pronotum. —Metanotum (Figs 25–27) similar to mesonotum.

Presternum narrow, with transverse row of very small simple setae (Fig. 28). All thoracic sterna trapezoidal with 1+1 combs of pectinate and smooth setae in the posterolateral corners. —Prothoracic sternum (Fig. 28) large, about as long as wide at its base, anterolateral corners each with a single seta; posterolateral combs of 10–11 marginal or submarginal setae, some strongly pectinate, others almost smooth (Fig. 29), the distance between the combs four to five times the length of each comb. —Mesosternum not well mounted (folded over and pushed against air bubble), similar to other thoracic sterna with 1+1 combs of five or six marginal or submarginal smooth or pectinate setae (Figs 30, 31). —Metasternum (Fig. 32) about 1.2 times wider than long, the posterolateral combs of four to six setae (Figs 33, 34) with the distance between the combs about eight times the length of each comb.

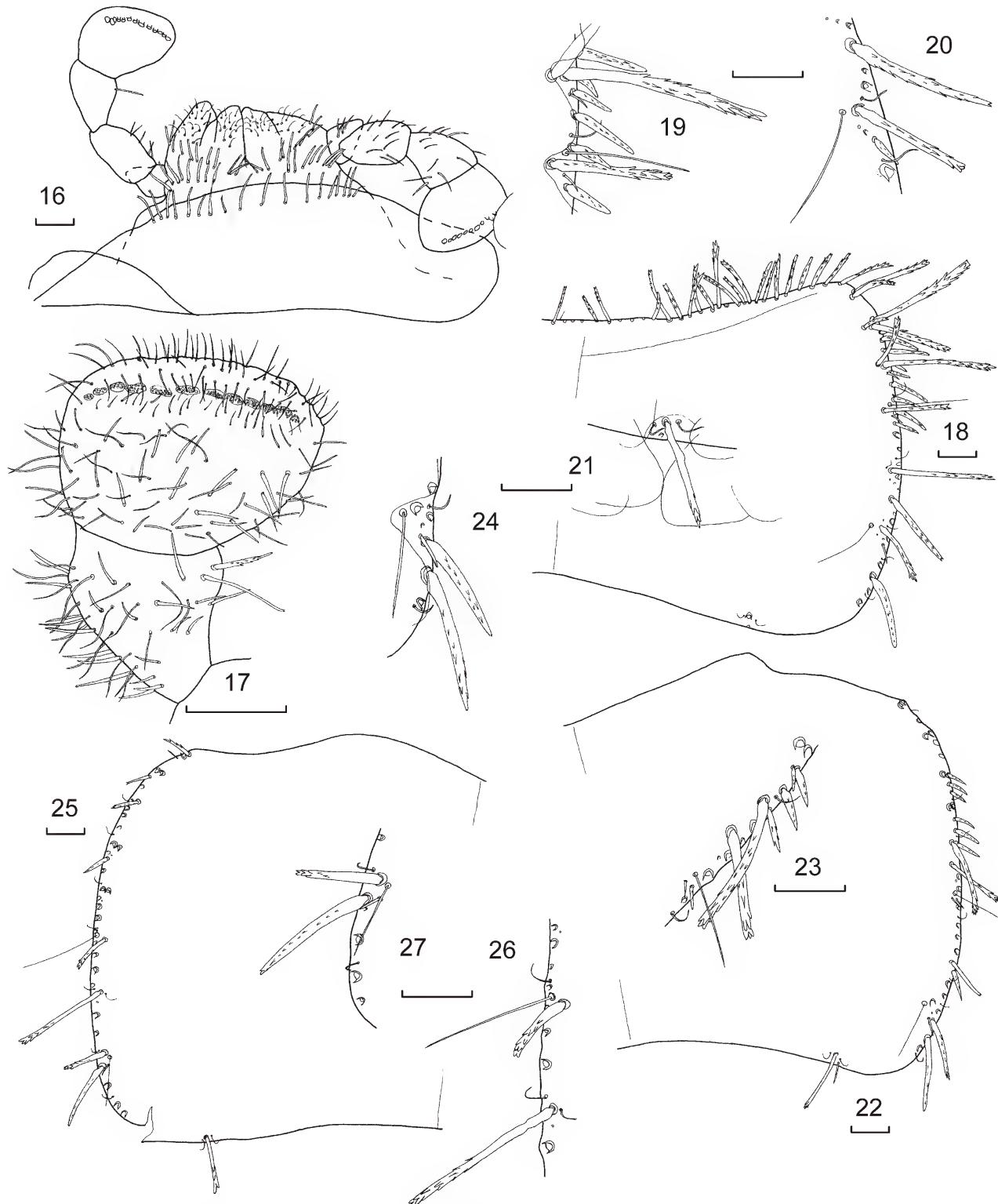
Legs robust and not particularly long, not lengthening strongly posteriorly with tibia III only 1.5 times longer than tibia I. Tibia L/W ratio PI 2.1, PII 2.4, PIII 2.4; tarsi L/W



Figures 3–15. *Qantelsella louisae* n.sp. holotype ♂ (3) habitus; (4) notal scale; (5) feathery macrochaeta with very long pectinations; (6) stout macrochaeta with fine pectinations; (7) long macrochaeta with rounded pectinations; (8) head; (9) basal articles of antenna; (10) distal articles of antenna showing a circular sensilla (cs) and rod-like basicornic sensilla (rs); (11) mandible; (12) idem, detail of incisor and molar regions; (13) maxilla; (14) idem, lacinia and galea; (15) idem, ultimate article of palp. Scale bar = 0.1 mm unless otherwise indicated.

ratio PI 4.4, PII 6.0, PIII 6.6. Leg PI (Fig. 28) with single pectinate macrochaeta laterally on small article between prothoracic presternum and coxa. —Outer margin of coxa

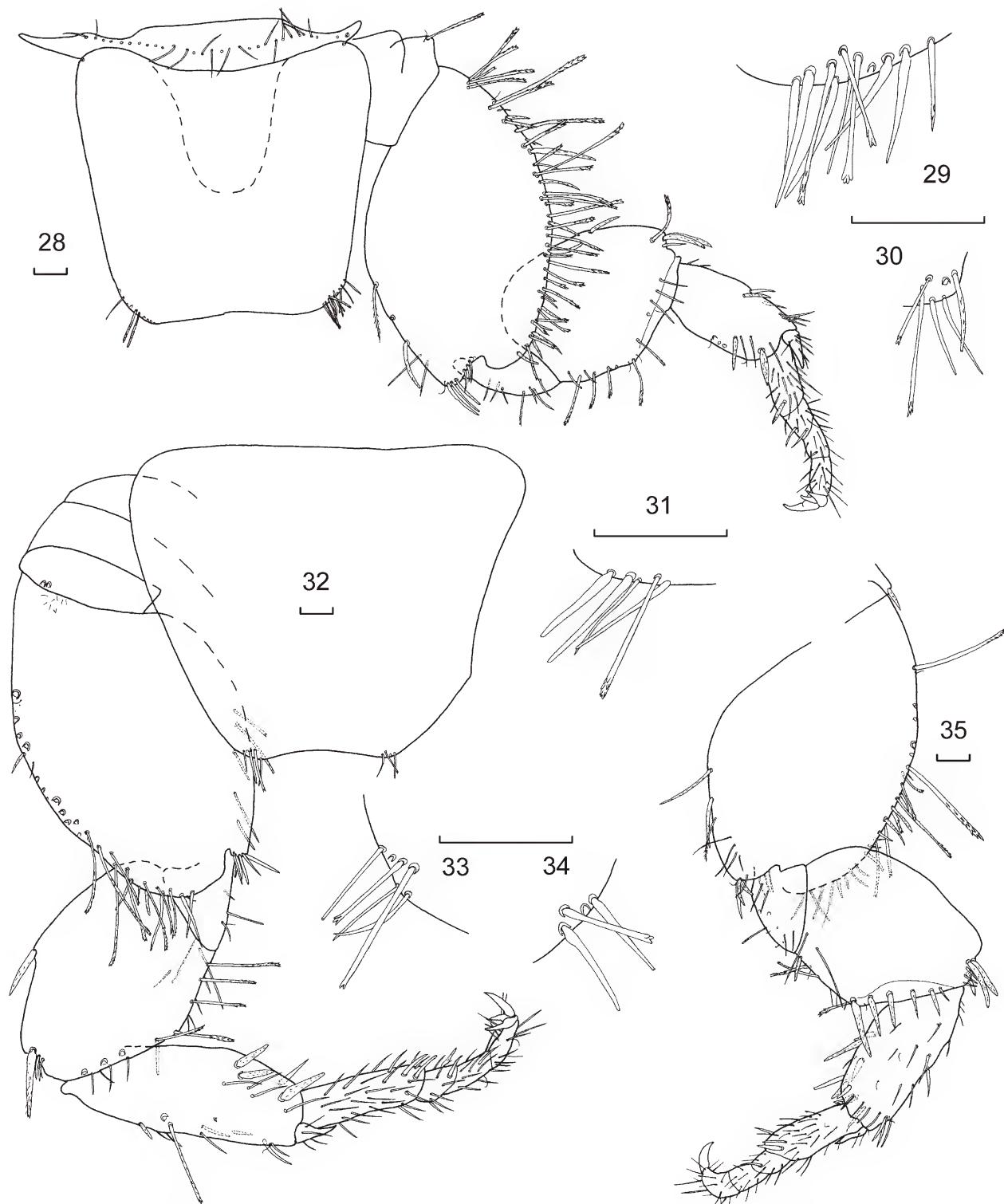
with numerous pectinate macrochaetae, forming a comb of five macrochaetae proximally, inner margin with three robust pectinate macrochaetae spaced in the distal half and several



Figures 16–27. *Qantelsella louisae* n.sp. holotype ♂ (16) labium; (17) ultimate articles of labial palp; (18) pronotum, right half; (19) idem, anterior trichobothrial area; (20) idem, posterior trichobothrial area; (21) idem, macrochaetae of posterior margin; (22) mesonotum, right half; (23) idem, anterior trichobothrial area; (24) idem, posterior trichobothrial area; (25) metanotum, left half; (26) idem, anterior trichobothrial area; (27) idem, posterior trichobothrial area. Scale bar = 0.1 mm.

simple macrochaetae over the articulation. —Trochanter with some simple and some small pectinate setae. —Femur short and very broad, with one robust pectinate macrochaeta midway along the outer margin and a group of three (?) stout pectinate macrochaetae over the distal articulation;

posterior margin with some long pectinate setae and simple setae adjacent to the tibia below and above a row of five or six stout pectinate macrochaetae. —Tibia short and wide with two robust macrochaetae midway along outer margin and some smaller simple setae over the articulation distally;



Figures 28–35. *Qantelsella louisae* n.sp. holotype ♂ (28) prothoracic presternum, sternum and PI; (29) idem, enlargement of left comb of sternum; (30) comb of mesothoracic sternum; (31) other comb of mesothoracic sternum; (32) metathoracic sternum and PIII; (33) idem, right sternal comb; (34) idem, left sternal comb; (35) PII. Scale bar = 0.1 mm.

posterior margin with at least two stout macrochaetae in distal half as well as other simple setae; apical spine with several fine setae. —Articles of tarsus with many simple setae and some more robust setae below. —Pretarsus with two strong but simple outer claws and a strong medial empodial claw. —PII and PIII with similar chaetotaxy (Figs 32, 35) but the basal tarsal article is comparatively longer

and about equal in length to the other three combined tarsal articles on both PII and PIII.

Abdominal chaetotaxy summarized in Table 1. Urotergite 1 with 1+1 lateral combs each consisting of two long submarginal pectinate macrochaetae and two marginal short, stout pectinate macrochaetae with two cilia, one at each end of the submarginal comb. Urotergites II–VIII

each with 2+2 combs (Fig. 36), the lateral combs (Fig. 37) similar to those on urotergite I, the sublateral combs (Fig. 38) consisting of just a single, long, pectinate macrochaeta with a cilium on each side and in most cases a small, thickish setula. Urotergite IX glabrous. Urotergite X (Fig. 39) short, subtriangular (L/W 0.37), without bristlecombs, with a very dense fringe of pectinate macrochaetae, those above more robust with delicate pectinations, those below hyaline with very long pectinations.

Table 1. Number of pectinate macrochaetae per bristlecomb + (number of marginal stout macrochaetae).

| segment | urotergite lateral | urosternite sublateral | urosternite lateral |
|---------|-----------------------|---------------------------|------------------------|
| I | 2 + (2) | — | — |
| II | 2 + (2) | 1 | — |
| III | 2 + (2) | 1 | 2 |
| IV | 2 + (2) | 1 | 2 |
| V | 2 + (2) | 1 | 2 |
| VI | 2 + (2) | 1 | 2–3 |
| VII | 2 + (2) | 1 | 3 |
| VIII | 2 + (2) | 1 | 4–5 + (5–6) |
| IX | — | — | — |

Urosternites I–II glabrous and III–VII (Fig. 40) each with 1+1 bristlecombs, composed of two to three long submarginal pectinate macrochaetae with a cilium external to the comb and a small but stout marginal seta with indistinct pectinations (Fig. 41). Urosternite VIII in ♂ entire (Fig. 42), with well-developed stylets, each armed apically with four or five stout but apparently smooth macrochaetae, as well as similar but smaller setae along the ventral face in the distal half. Lateral combs of urosternite VIII composed of four or five, long, pectinate macrochaetae mediad to the stylets and five to six short, stout pectinate macrochaetae on the dorsal surface of the margin either side of the insertion of the stylets.

Genital region of ♂ as in figure 43, the internal process of coxite IX not very long, about 1.2 times longer than wide at its base and about four times longer than the external process. Apex of internal process acute, with numerous strong macrochaetae along both the inner and outer margins; those macrochaetae inserted on the ventral side of the margin smooth or with very inconspicuous pectinations, those inserted dorsally more delicate with very obvious and long, almost feathery, pectinations. Inner and outer margins of outer process with several short, stout macrochaetae with the pectinations more pronounced on those inserted on the dorsal side of the margin. —Penis with numerous short glandular setae apically, each set on a protuberance. Parameres absent. —Stylets IX about 1½ times longer than those on urosternite VIII (excluding the apical macrochaetae), surpassing the apex of the inner process by a little less than the length of the inner process. Stylets armed apically with four or five stout but apparently smooth macrochaetae, as well as similar but smaller setae along the ventral face of the stylet (Figs 42, 43).

Terminal filaments probably incomplete. Basal articles of cerci and median dorsal appendages (Fig. 44) with hyaline feathered pectinate macrochaetae below becoming progressively less pectinate distally until completely smooth in the most distal surviving articles (Figs 45, 46).

Female unknown.

Habitat. In very dry shallow leaf litter on banks of ephemeral creek.

Etymology. The species is named for my wife Louise in appreciation of the many years of support and encouragement to follow my interest in silverfish.

Remarks

The thoracic and abdominal chaetotaxy of *Qantelsella* resembles that of the Namibian genus *Ornatilepisma* Irish but its morphology differs in several other characters usually also considered relevant at the genus level (cf. Irish, 1988). These include the cephalic chaetotaxy, especially that of the labrum (row of macrochaetae lacking in *Ornatilepisma*), the shape of the thoracic sternites (cordiform or parabolic in *Ornatilepisma*), the shape and chaetotaxy of urotergite X (short, rounded trapezoidal with 1+1 posterior combs in *Ornatilepisma*), the abdominal stylets (reduced or lacking in *Ornatilepisma*) and the number of papillae on the labial palp (only two in *Ornatilepisma*). *Qantelsella* may be derived from an *Acrotelsella*-like ancestor with a triangular urotergite X and two pairs of abdominal stylets but in many other ways is quite different. The genus *Acrotelsella* is quite diverse in Australia and much more work is required before its diversity is well enough understood to elaborate any relationship with *Qantelsella*.

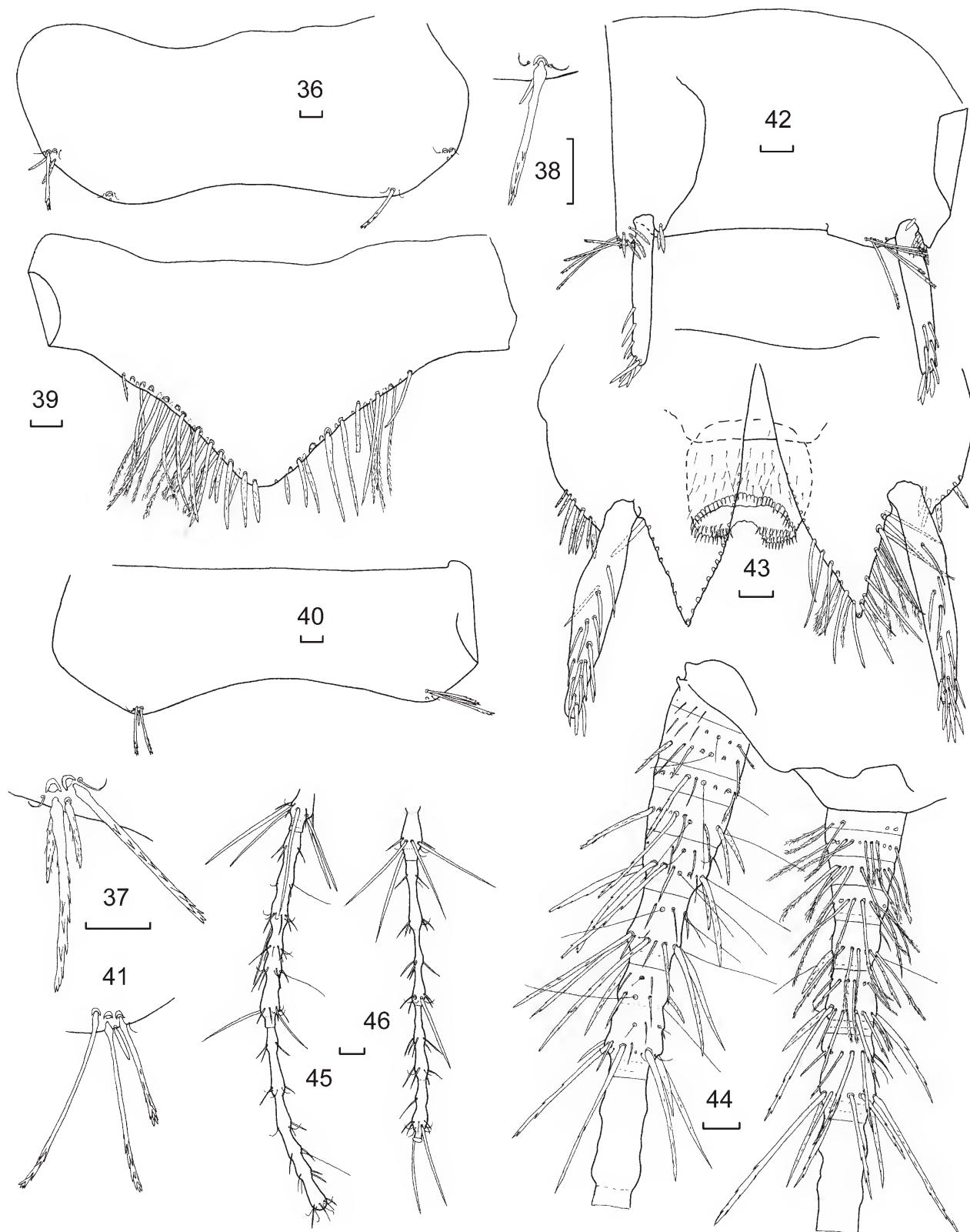
Subfamily Lepismatinae Latreille, 1802

Xenolepisma Mendes, 1981

Asterolepisma (*Xenolepisma*) Mendes, 1981: 201. Type species: *Lepisma globosa* Escherich, 1905 (original designation).

Xenolepisma Mendes, 1988: 12.

Diagnosis. (adapted from Mendes, 1988, and Irish, 1990). Body short, limuloid, up to 7 mm in length. Thorax wider than the base of the abdomen, about equal to or longer than half the abdomen's length, not very detached from its base and fairly convex. Pigment present. Body covered in scales, macrochaetae smooth, simple, bifid or trifid apically. Head small, free, without special characteristics; chaetotaxy of head consisting of a few macrochaetae around the eyes and a weakly developed band of setae and macrochaetae across the frons/clypeus between the antennae, clypeus and labrum with simple setae (see also Mendes, 1988, fig. 282). Eyes placed well forward and of medium development with intense pigment. Antennal sensillae asteriform. Maxillae palps small. Ultimate article of labial palp with five sensorial papillae of the compact type in two lines. All trichobothrial areas of all nota closed, encircled by scales and not in contact with edges of the respective nota; setal collar absent. Posterior margin of the nota with or without submarginal macrochaetae. Prosternum smaller than the remaining thoracic sternites. Legs typical for subfamily except tarsi of only three articles, pretarsi with two lateral claws and a shorter medial empodial claw; pulvilli absent. PIII of ♂ not modified. Urotergites I–IX with 1+1 infralateral marginal macrochaetae; urotergite I with additional 1+1 or 5+5 submarginal posterior isolated macrochaetae; urotergites II–VIII with at least an additional 2+2 submarginal isolated macrochaetae and as many as 5+5 on the more anterior segments (II–V). Urotergite X



Figures 36–46. *Qantelsella louisae* n.sp. holotype ♂ (36) urotergite II; (37) left lateral comb of urotergite IV; (38) sublateral comb of urotergite V; (39) urotergite X; (40) urosternite VI; (41) left comb of urosternite VII; (42) urosternite VIII; (43) coxites IX with penis and stylets; (44) base of cerci (on left) and median filament (on right); (45) cerci, most apical surviving articles; (46) median filament, most apical surviving articles. Scale bar = 0.1 mm.

trapezoidal, its posterior edge straight or concave. Urosternite I without comb of setae, II with a medium comb, III–VII (in ♀) on III–VIII (in the ♂) with one medium comb and 1+1 lateral combs. Stylets present in two pairs, on coxites VIII and IX. Penis of the usual shape, the parameres sacciform, strongly reduced. Ovipositor of the primary type and with subparallel sides. Cerci and median terminal filament short, very much shorter than half of the length of the abdomen.

Xenolepisma monteithi n.sp.

Figs 47–85

Type material. Holotype ♀ (probably not fully mature, HW 0.55) (QM T228756 on two slides) Queensland: Cape York, Bramwell Station, 12.13866°S 142.62345°E 73m asl, 21.vii.2013, Graeme Smith, pyrethrum spray to bark of Eucalypt. Paratypes 1 juvenile ♀ (HW 0.54) (QM T228757 on two slides), 1 juvenile ♀ (HW 0.50) (QM T228758 in alcohol with presumed host ants *Crematogaster* sp.), all same collection data as holotype.

Diagnosis. This species differs from other described species of the genus most obviously in the presence of macrochaetae on the posterior margins of the nota and in the 6+6 chaetotaxy of the anterior urotergites.

Description

Appearance in life as for all other known members of genus i.e. almost black in colour with distinct 1+1 large white patches on anterior half of mesonotum, transversely across the posterior two thirds of urotergite I and 1+1 patches on anterior margin of urotergite VII (see Smith *et al.*, 2011: plate 2), due to the presence of hyaline scales that allow the colour of the underlying integument to show through; these patches can be very difficult to define in animals that have lost a lot of their scale cover. All appendages appear light brown/white in colour.

Small insects (Fig. 47), about 3.5 mm long (estimated as abdomen distended in all specimens and probably not fully mature); maximum head width 0.55 mm; antennae incomplete in holotype ($>\frac{1}{2}$ H+B), probably just a little longer than the thorax; cerci short, less than one tenth H+B; median dorsal appendage incomplete in holotype, slightly longer than cerci exceeding the apex of urotergite X by about the length of this urotergite. Thorax about half the length of the abdomen; abdomen at its base not much narrower than the thorax and not clearly set apart from it.

Integument generally white with blotchy brownish pigment present on the back and sides of the frons, the entire clypeus, labrum and labium including mouthparts although less on the maxillary palp, especially the ultimate article, and absent from around the papillae on the ultimate article of the labial palp. Present on the scape but not pedicel; remainder of flagellum with some pigment in proximal half. Pigment present along sides of nota and also the posterior urotergites. Coxae with intense pigment but remaining articles white (except for hint of pigment along margins of femur), moderately strong pigmentation on prothoracic pre sternum and thoracic sternites.

Scales with numerous subparallel rays which do not surpass the posterior margin of the scale (Fig. 48), in alcohol

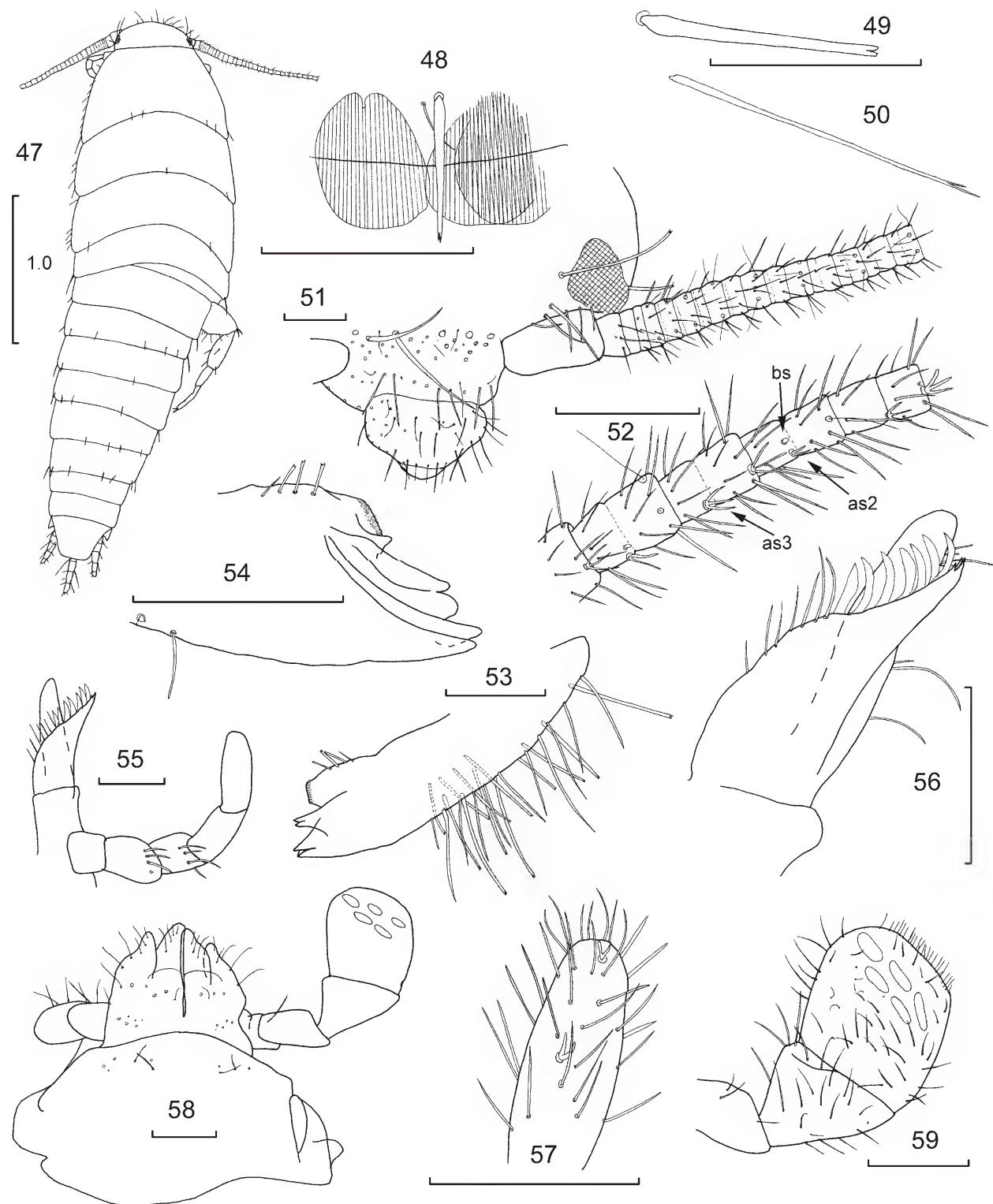
mostly dark to lighter brown in colour or hyaline. Scales on top of head but lacking elsewhere on head and absent from mouthparts and antennae, coxa heavily scaled, but scales absent from remaining leg articles. Ovipositor and terminal filaments without scales.

Macrochaetae smooth, some robust and apically bifurcate (Fig. 49), others more slender with delicate apical bifurcations (Fig. 50).

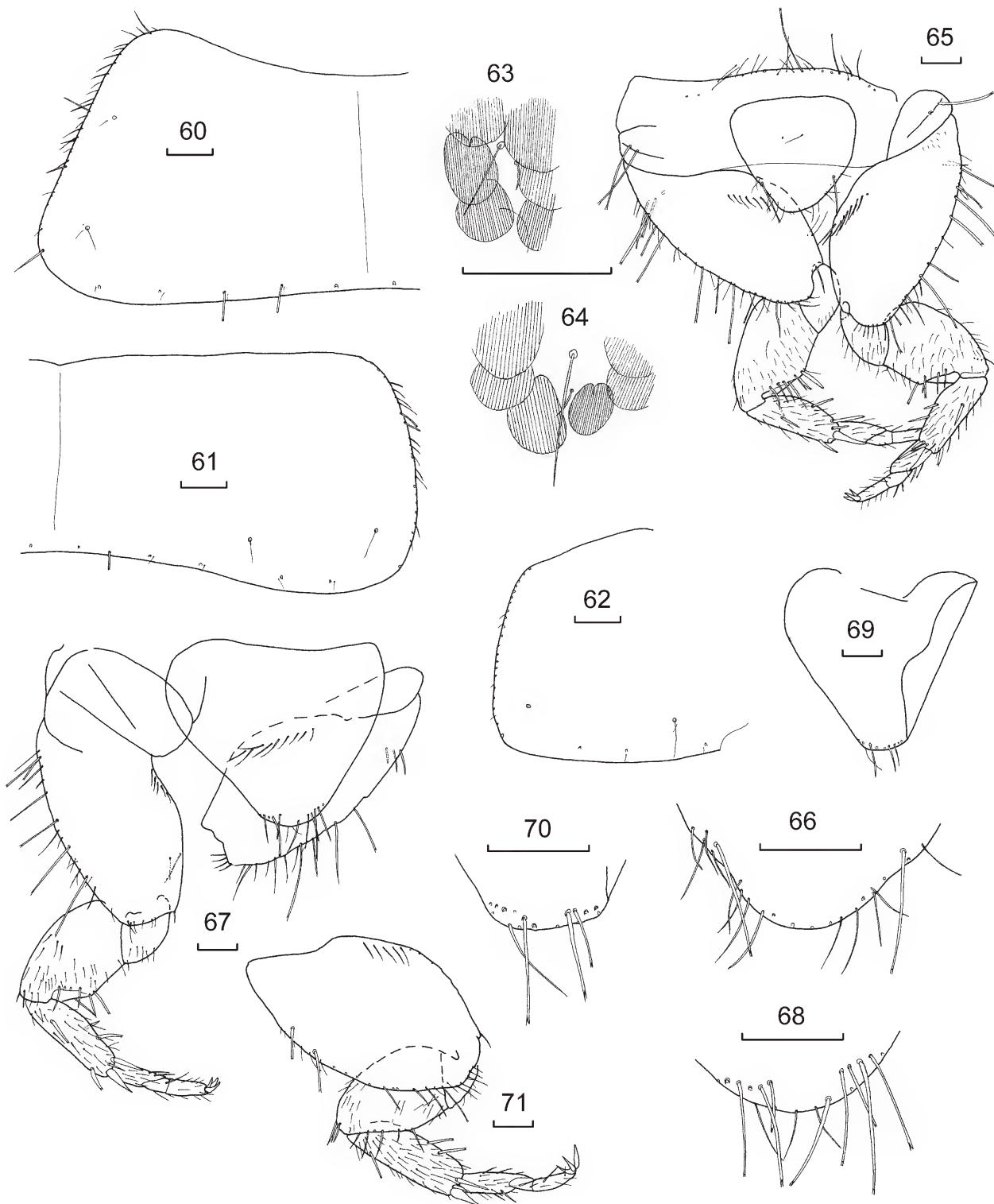
Head (Fig. 51) wider than long; eyes well forward; vertex lacking chaetotaxy; some strong macrochaetae around the eyes, a narrow field of a few strong macrochaetae and several smaller setae between antennae above the clypeus. Clypeus with area of weaker setae subdistally. Labrum with a few setae. —Antennae (Figs 51, 52) with subarticles of most distal surviving articles about as long as wide, with groups of four subarticles forming a chain with repeated sensillae patterns. Specialized asteriform sensillae present in distal two thirds of the flagellum (Fig. 52). Chains with a triramous asteriform sensilla on each of the two most distal subarticles of a chain, a trichobothrium on the following segment and a biramous specialized asteriform sensilla, usually adjacent to a small thin-walled basiconic sensilla (see Adel, 1984) on the basal subarticle of each chain. —Mandibles (Figs 53, 54) with three or four incisor teeth, and a distinct but small molar region and a field of about 20–30 strong, simple or apically bifurcate macrochaetae on external surface in proximal two thirds. —Maxillae (Figs 55–57), lacinia with three small teeth, one shorter than the others, followed by seven lamellate process and seven long setae; maxillary palp short, its distal article subcylindrical about 2.7–3.0 times longer than wide and 1.4–2.0 times longer than the penultimate article, the second article subapically with rosette of somewhat stronger stout, apically bifurcated macrochaetae, third article with similar but weaker rosette of slightly stronger simple setae, last article with fine setae and one or two (more?) biramous asteriform sensillae (Fig. 57). —Labium (Fig. 58), apical article of palp about 0.76–0.81 times longer than wide, with 3+2 large compact sensory papillae apically extending across most of the width of the article (Fig. 59).

Pronotum (Fig. 60) about 1.3–1.4 times longer than meso- and metanota respectively; lacking collar of setae along anterior margin. All nota with short macrochaetae on lateral margins and a submarginal row of 5+6 or 6+6 setae, each seta mostly, but not always associated with a small setula (Fig. 48). Each notum with two closed trichobothrial areas (isolated from margins by scales), those of the prothorax located anteriorly and subposteriorly, while those of the meso- (Fig. 61) and metanota (Fig. 62) are both subposterior. Each trichobothrial area provided with a short trichobothria and a small setula posterolaterally to it (Figs 63, 64).

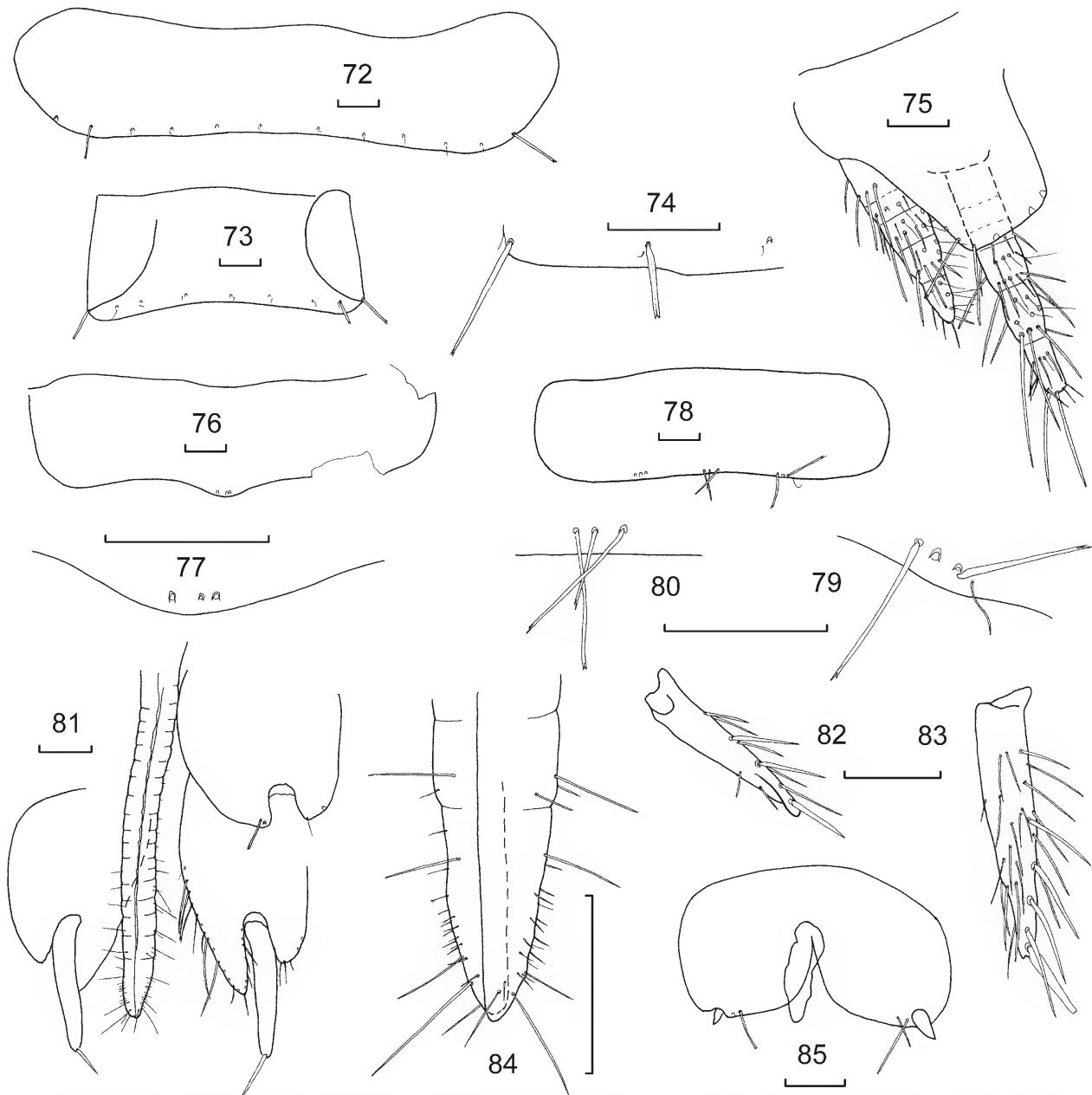
Presternum (Fig. 65) fairly wide with posterior marginal row of fine delicately apically bifurcate setae. Prothoracic sternum (Figs 65, 66) small, subcordiform, slightly wider at its base than long, with small emargination on each side, several fine marginal setae and 1+1 larger stronger delicately bifurcate submarginal setae, as well as 1+1 fine setae submedially. —Mesosternum (Fig. 67, 68) about 1.2 times as wide as long and not obviously emarginated, with some small marginal setae distally and 1+1 subapical combs of four to five long, apically delicately bifurcate setae; the distance between the combs being slightly more than the length of each comb. —Metasternum (Figs 69, 70) similar in size and chaetotaxy to mesosternum.



Figures 47–59. *Xenolepisma monteithi* n.sp. ♀ (47) habitus; (48) scales and posterior macrochaeta of pronotum; (49) robust, apically bifurcate macrochaeta; (50) slender, delicately bifurcate macrochaeta; (51) head and base of antenna (cross-hatched area obscured by dark pigment from eyes); (52) antenna, most distal surviving article showing biramous (as2) and triramous (as3) asteriform sensillae and the thin-walled basiconic sensilla (bs); (53) mandible; (54) idem, detail of incisor and molar regions; (55) maxilla; (56) idem, detail of lacinia and galea; (57) idem, last article of maxillary palp; (58) labium; (59) idem, last two articles of palp. Scale bar = 0.1 mm unless otherwise indicated.



Figures 60–71. *Xenolepisma monteithi* n.sp ♀ (60) pronotum, left half; (61) mesonotum, right half; (62) metanotum, left side; (63) anterior trichobothrial area of mesonotum; (64) posterior trichobothrial area of mesonotum; (65) pre sternum, prothoracic sternum and P1; (66) apex of prothoracic sternum; (67) mesothoracic sternum and PII; (68) apex of mesothoracic sternum; (69) metathoracic sternum; (70) idem, apex; (71) PIII. Scale bar = 0.1 mm.



Figures 72–85. *Xenolepisma monteithi* n.sp. ♀ (72) urotergite III; (73) urotergite VII; (74) lateral and first posterior submarginal macrochaetae of urotergite I; (75) urotergite X, left cercus and median filament; (76) urosternite II; (77) idem, detail of medial comb; (78) urosternite IV; (79) idem, left lateral comb; (80) idem, medial comb; (81) coxite VIII, coxites IX and ovipositor; (82) stylet VIII; (83) stylet IX; (84) apex of ovipositor; (85) coxites VIII and developing ovipositor of paratype (T228757). Scale bar = 0.1 mm.

Legs (Figs 65, 67, 71), tibia L/W PI 2.1–2.5, PII 2.5–3.1, PIII 3.1–3.4; tarsi L/W PI 5.4–6.0, PII 5.8–6.8, PIII 5.8–7.3; sclerite immediately basal to each coxa of PI with two long stronger, apically bifurcate setae. —Coxae of all legs scaled with strong apically bifurcate macrochaetae, some robust and other more delicate, and finer smaller setae along the outer margins; ventral surface medially with a comb of 11–12 simple short setae and on dorsal surface anteriorly combs of two or three delicately apically bifurcate macrochaetae near the outer margin and medially two long fine setae posteriorly. —Trochanter fairly large with setae only. —Femur with one longer stout and two smaller macrochaetae at medial posterior angle and some stronger setae along the ventral ridge distad of the medial angle, rest of ventral surface covered in fine setae. —Tibia with two stout macrochaetae distally, one

of which is the same length as the apical spur; ventral face with one stout macrochaeta about one third the distance along the tibia, another stout macrochaeta on the posterior margin and another on the anterior margin near the distal end; rest of surface covered in fine setae. —Tarsi consisting of three articles covered with setae. —Pretarsus with two lateral claws and a medial slightly shorter empodial claw.

Abdominal chaetotaxy summarized in Table 2. Urotergites I–IX (Figs 72, 73) with 1+1 infralateral macrochaetae almost $\frac{1}{2}$ the length of the corresponding tergite located on the margin of the tergite. Urotergites I–V with additional 5+5 distinctly submarginal setae which are shorter than the infralateral macrochaetae (Fig. 74) and somewhat superficially similar in appearance to the abiesiform setae of *Australiatelura* spp. (see Smith & McRae, 2014: 106) distributed with almost

equal spacing anterior to the posterior margin, the number of macrochaetae decreasing progressively to only 3+3 in total on IX. Most urotergal setae associated with a small cilia located between the insertion of the seta and the margin and usually slightly laterad to it (Fig. 74). Urotergite X (Fig. 75) trapezoidal, with 2+2 macrochaetae along the almost straight posterior border (more concave in juvenile paratype) and at least one macrochaeta on lateral border.

Table 2. Number of macrochaetae per bristlecomb.

| segment | urotergites isolated macrochaetae per side (including infralaterals) | urosternites macrochaetae per comb lateral | medial |
|---------|--|---|--------|
| I | 6+6 | — | — |
| II | 5+6 | — | 3 |
| III | 6+6 | 1–2 | 4 |
| IV | 6+6 | 3 | 3 |
| V | 6+6 | 3 | 4 |
| VI | 5+5? | 3 | 2 |
| VII | 4+5 | 3 | 4 |
| VIII | 4+4 | 2 | — |
| IX | 3+3 | — | — |

Urosternite I without combs. Urosternite II with a narrow medial comb of three long, thin apically bifurcated macrochaetae (Figs 76, 77). Urosternites III–VII (Fig. 78) with 1+1 sublateral combs (Fig. 79) each of 1–4 delicately apically bifurcate macrochaetae associated with a small cilia and in one case a setula between two of the macrochaetae of one comb and one medial comb (Fig. 80) of 2–4 long, thin macrochaetae. The lateral combs on III more mediad than those of the more posterior segments. Coxites VIII of ♀ with 1+1 combs of two macrochaetae internal to stylets (Fig. 81). Internal process of coxite IX of ♀ (Fig. 81) about 1.8 times as long as broad at the base and 1.6 times longer than the external process. —Stylets on urosternites VIII and IX in ♀ holotype (Figs 82, 83). —Ovipositor (Figs 81 and 84) only just surpassing apex of internal processes of urosternite IX; with about 18 articles and only fine setae. It is however quite likely that the ovipositor of the holotype has not achieved its maximum length as the juvenile female paratype with a head width only slightly less than the holotype has a very rudimentary ovipositor and stylets only just appearing on coxites VIII (Fig. 85).

Terminal filaments short, cerci consisting of only about five articles and median filament of about seven, the latter only extending beyond the posterior margin of urotergite

X by about the length of the urotergite (Fig. 75); terminal filaments with numerous small trichobothria and some small and also strong macrochaetae.

Mature males unknown.

Habitat. Collected using pyrethrum spray to bark of Eucalypt tree in a semi-open tropical woodland environment. Several *Acrotelsella* specimens, as well as ants of the genus *Crematogaster*, were collected from the same area of rough bark (c. 0.5m²). It is assumed that the *Xenolepisma* were associated with these ants.

Etymology. The species is named for Dr Geoff Monteith as a way of thanking him for introducing me to his pyrethrum spray sampling method (outlined in Baehr, 1995). The method has proven remarkably effective at non-destructively sampling complex habitats and has opened my eyes to the importance of the bark of standing trees as a habitat for so many Australian lepismatid species.

Remarks

Xenolepisma monteithi is the first Australian native species of the subfamily Lepismatinae to be described. This subfamily has its greatest number of species in the Afrotropical and Palearctic regions. The only other species of the subfamily reported from Australia is the cosmopolitan anthropophilic European household silverfish *Lepisma saccharina* Linnaeus, 1775 which was recorded doubtfully by Silvestri (1908) and reported as common within storage facilities in the “larger towns of the Commonwealth” by Womersley (1939). The genus *Xenolepisma* is also known from southern Africa, India and peninsula Malaysia. Smith *et al.* (2011) discussed the history of this genus when describing *Xenolepisma penangi* and also presented a key to the species of the genus. The new species would key to *X. subnigrina* Silvestri at the first couplet but can easily be separated from it by the presence of macrochaetae on the posterior margins of the nota (absent in all other species described from the genus) and the 6+6 macrochaetae on the posterior margin of the more anterior urotergites. Smith & Watson (1991) noted the presence of *Xenolepisma* in Australia based on a single specimen collected at Bundeena near Sydney in New South Wales (ANIC), specimens collected near Townsville (ANIC) and with termites near Coen (ANIC), both in Queensland (Fig. 1). There are also two records from the Northern Territory with a specimen collected from a mangrove stump near Darwin (ANIC) and Conway (1992) reported *Xenolepisma* sp. from a dormant nest of the Red Honey Ant (*Melophorus bagoti* Lubbock) at Alice Springs. Presumably the genus is widespread but not commonly encountered.

ACKNOWLEDGMENTS. For the decision to erect a new genus for *Qantelsella* I am very grateful for the advice of Dr Luis Mendes, (Lisbon, Portugal) and Dr Rafael Molero-Baltanás (Cordoba, Spain) both of whom discouraged me from my original plan to include the species within *Ornatilepisma*. They willingly shared their extensive experience, including of the African fauna, resulting in this revision of my earlier draft. I would also like to thank Dr Geoff Monteith, formerly QM, for collecting advice, the Queensland Department of Environment and Heritage Protection for permission to collect within the Bladensburg National Park, Mr Derek Smith of the Australian Museum for identification of the ant species from Bramwell Station and Dr Shane McEvey, also of the Australian Museum, for assistance with the illustrations.

References

Adel, T. 1984. Sensilleninventar und sensillenmuster auf den Antennen von *Thermobia domestica* und *Lepisma saccharina* (Insecta: Zygentoma). *Braunschweiger Naturkundliche Schriften* 2: 191–217.

Baehr, M. 1995. Revision of *Philipis* (Coleoptera: Carabidae: Bembidiinae), a genus of arboreal Tachyine beetles from the rainforests of eastern Australia. Taxonomy, phylogeny, and biogeography. *Memoirs of the Queensland Museum* 38: 315–381.

Conway, J. R. 1992. Notes on the excavation of a nest of *Melophorus bagoti* Lubbock in the Northern Territory, Australia (Hymenoptera: Formicidae). *Journal of the Australian Entomological Society* 31: 247–248.
<http://dx.doi.org/10.1111/j.1440-6055.1992.tb00500.x>

Escherich, K. 1905. Das System der Lepismatiden. *Zoologica* (Stuttgart) 43(18): 1–164.

Irish, J. 1988. New psammophilous Lepismatidae (Thysanura) from southwestern Africa. *Cimbebasia* 10: 31–46.

Irish, J. 1990. Phylogeny of the Lepismatidae (Thysanura), with a revision of the southern African genera. Unpublished Ph.D. thesis, Faculty of Science, University of Pretoria. 337 pp.

Irish, J., and L. F. Mendes. 1988. New genera and species of ultra-psammophilous Namib Desert Lepismatidae (Thysanura). *Madoqua* 15(4): 275–284.

Mendes, L. F. 1981. Nota sobre o género *Asterolepisma* e descrição de una nova especie (Zygentoma, Lepismatidae). *Revue de Zoologie Africaine* (Tervuren) 95(1): 200–209.

Mendes, L. F. 1988. Revisão do género *Lepisma* Lin., 1758 s.lat. (Zygentoma, Lepismatidae). *Boletim da Sociedade Portuguesa de Entomologia* (Suppl.) 2: 1–236.

Nicholls, G. E., and K. C. Richardson. 1926. A description of two new species of *Acrotelsa*. *Journal of the Royal Society of Western Australia* 12(15): 133–142.

Silvestri, F. 1908. Thysanura. In *Die Fauna Südwest-Australiens. Ergebnisse der Hamburger südwest-australischen Forschungsreise 1905*, ed. W. Michaelsen & R. Hartmeyer, vol. 2, pp. 47–68. Jena: Gustav Fischer.

Smith, G. B. 2013. A new species of *Heterolepisma* from Barrow Island (Zygentoma: Lepismatidae). *Records of the Western Australian Museum*. Supplement 83: 229–240.

Smith, G. B. 2014. Two new species of *Heterolepisma* (Zygentoma: Lepismatidae) from eastern New South Wales. *General and Applied Entomology* 42: 7–22.

Smith, G. B., S. M. Eberhard, G. Perina, and T. Finston, 2012. New species of short range endemic troglobitic silverfish (Zygentoma: Nicoletiidae) from subterranean habitats in Western Australia's semi-arid Pilbara region. *Records of the Western Australian Museum* 27: 101–116.

Smith, G. B., and J. M. McRae. 2014. New species of subterranean silverfish (Zygentoma: Nicoletiidae: Atelurinae) from Western Australia's semi-arid Pilbara region. *Records of the Western Australian Museum*. 29: 105–127.

Smith, G. B., G. Veera Singham, M.-K. Kuah, and C.-Y. Lee. 2011. Two new inquiline silverfish (Zygentoma: Ateluridae, Lepismatidae) from Malaysia. *Sociobiology* 57(1): 19–34.

Smith, G. B., and J. A. L. Watson. 1991. Thysanura Zygentoma (Silverfish). In *The Insects of Australia*. ed. CSIRO, Division of Entomology, pp. 275–278. Melbourne: Melbourne University Press.

Womersley, H. 1939. *Primitive insects of South Australia. Silverfish, springtails and their allies*. Adelaide: Frank Trigg, Government Printer, 322 pp.

Womersley, H. 1942. A new species of silver-fish from Lord Howe Island. *Records of the Australian Museum* 21(2): 116–117.
<http://dx.doi.org/10.3853/j.0067-1975.21.1942.264>

Manuscript submitted 9 February 2015, revised 20 April 2015, and accepted 29 April 2015.